

Descriptive epidemiology of refugee health in New Zealand

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Abstract

Background

The common health issues of people from refugee backgrounds are well documented. However, little is known about the health care utilisation and health outcomes of this population once they have re-settled in New Zealand.

The objective of this study is to quantitatively describe morbidity and mortality outcomes and the level of health service utilisation of people from refugee backgrounds in New Zealand.

Methods

The encrypted National Health Index (NHI) of people from refugee backgrounds who arrived in New Zealand from 2004 to 2007 were linked to: the national datasets of hospital discharges, outpatients, primary health organisation records, laboratory requests and pharmaceutical dispensing up to 31/03/2009.

Results

The encrypted NHIs of 2919 people from quota refugee backgrounds were successfully linked to the national health datasets. This population had a young age structure with more than 90% of them under the age of 45 at the time of arrival in New Zealand. There was only one death reported within the study period.

Refugees have a very high level of enrolment in Primary Health Organisations (PHO) with 95% are currently enrolled in 2009. Proportionally more people from the 2007 cohort were enrolled in a PHO in a more timely manner than people from earlier cohorts.

Hospitalisation rates of the refugee population were substantially higher compared to other groups in New Zealand. The cohort that arrived in 2005 had an age standardised hospitalisation rate 99% higher than Maori and 170% higher than non-Maori, non-Pacific people in the 07/2006 to 06/2007 period. 'Dental caries' (n=141) and 'special screening examination for respiratory tuberculosis' (n=87) were the two most common diagnoses made in hospital. The most common primary diagnosis of admissions that lasted 10 days or more was bronchiectasis (n=7).

Tuberculosis is common among people from refugee backgrounds. However, the majority of cases of tuberculosis were diagnosed within the first two years of arrival in New Zealand. All children aged 15 years or younger received a Mantoux screening test and a significant proportion (17%) of them subsequently received isoniazid treatment for latent tuberculosis infection.

The 2004 cohort had an age-standardised mental health service utilisation rate of 4443 (unique) patients per 100,000 persons in 2004/2005 which was 59% higher than Maori and 109% higher than non-Maori non-Pacific rates in the corresponding year.

Conclusion

This study confirms that people from refugee backgrounds have high health needs as illustrated by the high level of health service utilisation. The high PHO enrolment should be seen as an exciting opportunity for primary care to develop and implement population based health promotions or preventive strategies to reduce the morbidity burden in this population.

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Abbreviations

ARPHS	Auckland Regional Public Health Service
ED	Emergency Department
ICD	International Statistical Classification of Diseases and Related Health Problems
LTBI	Latent Tuberculosis Infection
MHINC	Mental Health Information National Collection
MRRC	Mangere Refugee Resettlement Centre
NHI	National Health Index
NMDS	National Minimum Dataset
NNPAC	National Non-Admitted Patient Collection
PHO	Primary Health Organisation
PRIMHD	Programme for the Integration of Mental Health Data
TB	Tuberculosis
UNHCR	United Nations High Commissioner For Refugees
WHO	World Health Organization

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Introduction:

New Zealand is one of the 147 countries that has signed the 1951 United Nations Convention relating to the Status of Refugees and its 1967 protocol.^{1,2} As part of New Zealand's ongoing commitment to fulfil its international humanitarian obligations and responsibilities, refugees have been accepted for resettlement in New Zealand since the second world war.³ In recent years, New Zealand has an annual resettlement quota of 750 refugees. New Zealand targets people in the greatest need of resettlement as mandated by the United Nations High Commissioner for Refugees (UNHCR).

The common health issues of people from refugee backgrounds are well documented.⁴ The Ministry of Health published a handbook describing the unique health needs of the people from backgrounds in 2001.⁵ However, there is little literature that describes the level of health service utilisation and the health outcomes of people from refugee backgrounds once they have settled in New Zealand. Furthermore, many international refugee health studies are based on surveys or only a small number of people, which may be subjected to selection and recall biases.

New Zealand is one of the few countries in the world that assigns a unique national identifier for everyone who has accessed health care services within the country. The unique national identifier is called the National Health index (NHI). Using the encrypted NHI it is possible to link various routinely collected national health datasets. This provides the opportunity to systematically examine health services utilisation and health outcomes of a defined cohort.

Quota refugees spend their first 6 weeks in New Zealand at the Mangere Refugee Resettlement Centre (MRRC) in Auckland.⁵ The refugees receive services from a number of agencies to assist them to settle in New Zealand during the time at MRRC.⁴ There is a medical clinic at MRRC where all quota refugees receive health screening and treatment of any medical problems found. The medical services at MRRC are provided by Auckland Regional Public Health Service (ARPHS) and each person who attends the medical clinic is assigned a NHI. In this study, only encrypted NHIs were linked to the national routinely collected datasets to ensure health information extracted was not individually identifiable.

The aim of this study is to quantitatively describe morbidity and mortality outcomes and the level of health service utilisation of people with refugee backgrounds in New Zealand.

This study was approved by Northern Y Regional Ethics Committee, Ministry of Health and the Auckland District Health Board Research Review Committee (Ref: NTY/08/111/EXP).

Methods:

Study Population:

People from quota refugee backgrounds who settled in New Zealand from 2004 to 2007.

Data sources:

The NHIs of quota refugees were sourced from the medical clinic at MRRC. The health outcome and health service access data were sourced as per Table 1. Specific collection and verification methods of national data collection are documented in the respective data dictionaries on the Ministry of Health website.⁶

Table 1: Data sources of the study

Type of data	Data source	Time period studied
1. Demographic details	NHI database	Last updated on 22/04/2009
2. Hospitalisation discharge diagnostic and procedural codes	National Minimum Dataset (NMDS)	01/01/2004 to 31/03/2009
3. Outpatient and emergency department events	National Non-admitted Patient Collection (NNPAC)	01/07/2006 to 01/07/2007
4. Mortality data	Mortality Collection	2004 to 2006
5. Primary health organisation (PHO) enrolment data	Primary Health Organisation Enrolment Collection.	01/07/2004 to 01/04/2009
6. Community laboratory tests performed	Laboratory Claims Collection	01/01/2004 to 31/03/2009
7. Public funded pharmaceutical dispensing	Pharmaceutical Collection	01/01/2004 to 31/03/2009
8. Mental health data	Mental Health Information National Collection	01/01/2004 to 30/06/2008

Emergency department attendance rates were derived using the following codes from NNPAC database.

Table 2: Purchase unit codes from NNPAC database that identify emergency department attendance.

Purchase Unit Code	Description
ED02001	Emergency Dept - Level 2
ED02001A	Emergency Dept - Level 2 Admitted
ED03001	Emergency Dept - Level 3
ED03001A	Emergency Dept - Level 3 Admitted
ED04001	Emergency Dept - Level 4
ED04001A	Emergency Dept - Level 4 Admitted
ED05001	Emergency Dept - Level 5
ED05001A	Emergency Dept - Level 5 Admitted
ED06001	Emergency Dept - Level 6
ED06001A	Emergency Dept - Level 6 Admitted

Table 3: Purchase unit codes from NNPAC database that identify outpatient dental services received.

Purchase Unit Code	Description
D01002	Outpatient Dental treatment
D01005	Emergency Dental Care for Low Income Adults

Linkage via encrypted NHI

People from refugee backgrounds were stratified into 4 cohorts by their year of arrival in New Zealand. The NHIs were encrypted using a unique encryption method by the Information Directorate, Ministry of Health*. To ensure anonymity of individuals no other health information was provided by the medical clinic. The analyses were based on the linkage of the encrypted NHI with the data sources listed above.

Since the refugees come to New Zealand six times a year in groups of about 125, the follow up time period is taken from 30 June of the arrival year of the respective cohort to end date of the dataset being studied. The follow up observation time since arrival is measured in patient-years. Rates were age standardised using World Health Organization (WHO) world population as the standard population.⁷ For the

* Formerly called New Zealand Health information Service

mental health data analyses, the numerator of the age standardised rate refers to the number of unique patients seen.

Analyses of diagnoses made and procedures performed in hospital were based on International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD 10) codes recorded in NMDS database.

Identification of active tuberculosis and latent tuberculosis infection cases

Tuberculosis (TB) disease status is identified by linkage of data sourced from NMDS (hospital records) and the Pharmaceutical Collection between 1/04/2004 to 31/03/2009. The Pharmaceutical Collection is an administrative database that contains information of subsidised pharmaceutical dispensing from community pharmacies. However, it does not record information about non-subsidised pharmaceuticals or pharmaceuticals dispensed from inpatient pharmacies. Anti-tuberculous medications that are fully funded include ethambutol, isoniazid, pyrazinamide, rifampicin and rifabutin.⁸

In this study, an active TB case is defined as any person who had been discharged from hospital with primary diagnosis of tuberculosis ICD 10 codes (A15-A19) and/or who had received 3 or more anti-tuberculosis drugs (namely three of the following: ethambutol, isoniazid, pyrazinamide, rifampicin and rifabutin) within the study period. Anyone who had been prescribed isoniazid but did not fit the definition of active tuberculosis is considered to have latent tuberculosis infection (LTBI). The use of rifampicin alone can be non-specific and those cases who received rifampicin alone are not included in the latent tuberculosis infection group. Crude prevalence of TB was estimated by dividing the number of cases diagnosed with TB in the calendar year of arrival by the total number of population in the respective cohort. Prevalence was age standardised directly using WHO world population as the standard population.

Results:

Demography of study population

Number of people from refugees backgrounds studied

Based on the records of the MRRC, 2923 quota refugees arrived in New Zealand from 2004 to 2007. The Information Directorate successfully linked 2919 (99.9%) encrypted NHIs of individuals from refugee backgrounds to routinely collect health datasets (Table 4).

Table 4: Number of quota refugees by year of arrival

Year of arrival	Number
2004	775
2005	736
2006	674
2007	734
Total number of study population	2919

Gender distribution

Females made up of 48.5% of the population (Table 5).

Table 5: Number of quota refugees by gender

Gender	Number	Percentage
Females	1417	48.5%
Males	1502	51.5%
Total	2919	100%

Ethnicity

The majority of the people were of Middle Eastern, African, and Asian ethnicities (Table 6).

Table 6: Number of quota refugees by ethnicity

Ethnicity group	Number
Middle Eastern	1421
African (or cultural group of African origin)	661
Asian (not further defined)	282
Other Asian	249
Southeast Asian	177
Other	32
Latin American / Hispanic	26
Indian	25
Chinese	23
Other European	10
Not stated	8
Other	5
Total	2919

Area of residence

Most people (59%) settled within the boundaries of the three District Health Boards in the wider Auckland region and the highest number (n=809) residing in areas served by the Counties Manukau District Health Board (Table 6).

Table 7: Number of quota refugees by locality

Name of District Health Board	Number of quota refugees	Percentage of total (%)
Counties Manukau District Health Board	809	27.71
Auckland District Health Board	494	16.92
Waitemata District Health Board	408	13.98
Canterbury District Health Board	385	13.19
Capital and Coast District Health Board	252	8.63
Hutt Valley District Health Board	154	5.28
Waikato District Health Board	148	5.07
Wairarapa District Health Board	130	4.45
Mid Central District Health Board	110	3.77
Hawkes Bay District Health Board	21	0.72
Otago District Health Board	4	0.14
Bay of Plenty District Health Board	2	0.07
Southland District Health Board	1	0.03
Unknown	1	0.03
Grand Total	2919	27.71

Age distribution

The refugee population has a young age distribution on arrival in New Zealand with majority less than 20 years of age and more than 90% of them under the age of 45 at the time of arrival in New Zealand. The mean and median age was 21.8 and 18.1 respectively.

Figure 1: Number of quota refugees settled in NZ from 2004 to 2007 by age.

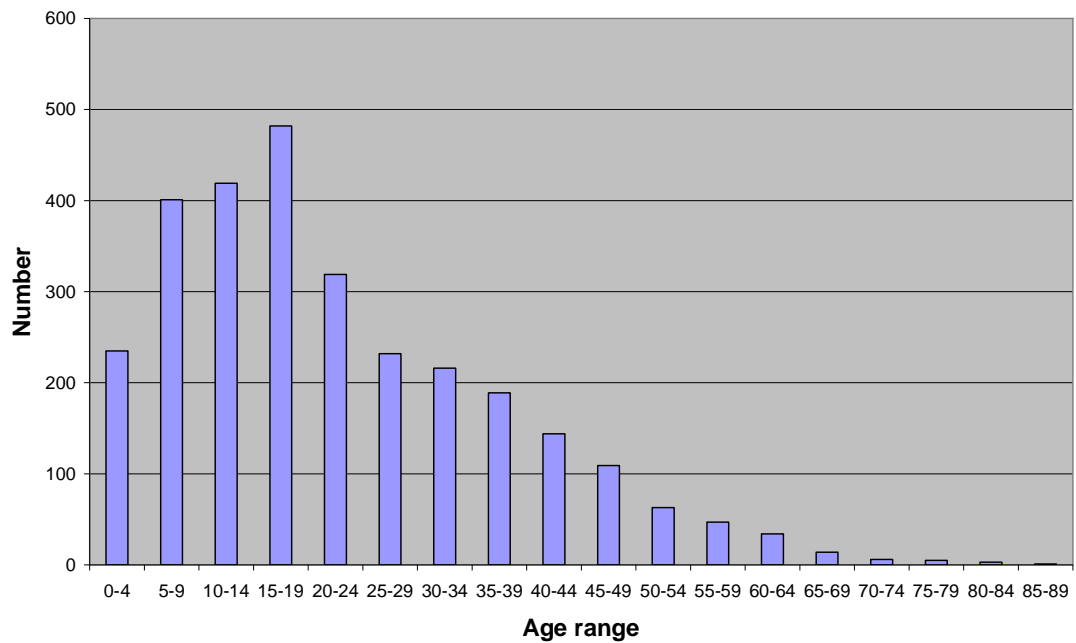
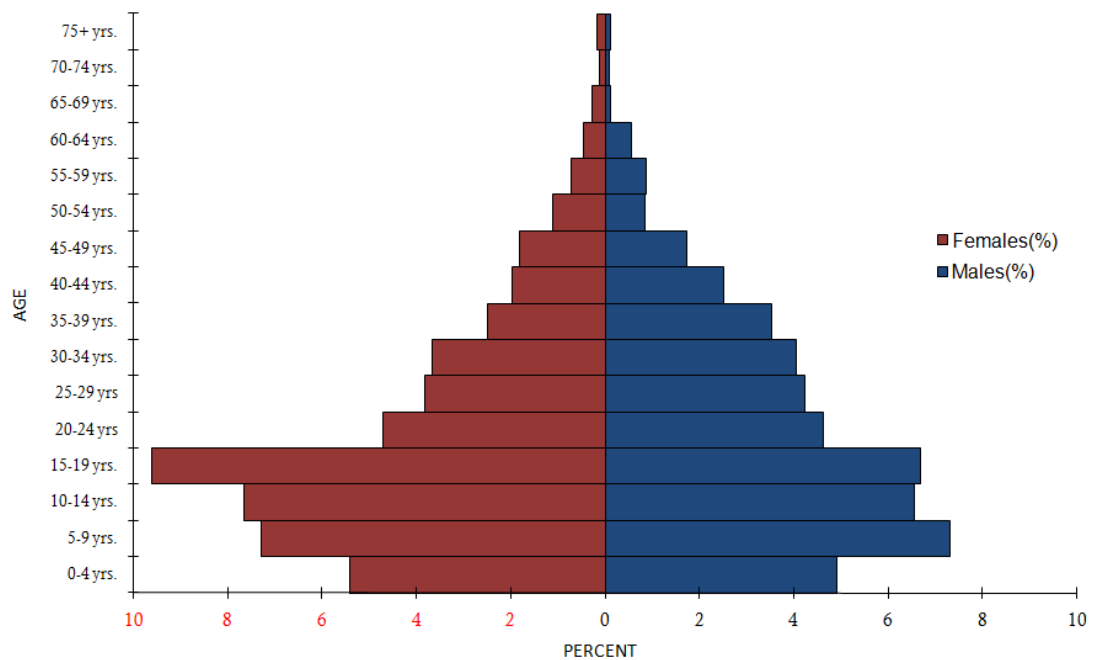


Figure 2: Age distribution of quota refugees settled in NZ by percentage



Mortality

Limited mortality data is available from this study because of the relatively short follow up or observation time. There was only one death reported in the cohort in 2007 (based on death registration).

Primary health organisation enrolment

Primary Health Organisation (PHO) enrolment occurs after the departure from MRRC. This study found that 98.7% of the study population (n=2881/2919) had enrolled in a PHO following resettlement. There were only 38 people who never enrolled in a PHO. The demographic details of the 38 non-enrolees are shown in Table 8 and Table 9. As of 1 April 2009, **95%** (2771/2919) of the study population is currently enrolled in a PHO.

Table 8: Non enrolees by year of arrival and DHB residence.

Name of DHB	Year of arrival in New Zealand				Total
	2004	2005	2006	2007	
Waitemata District Health Board			2	1	3
Auckland District Health Board		1	2	2	5
Counties Manukau District Health Board	16	5	2	5	28
Waikato District Health Board				1	1
Otago District Health Board	1				1
Total	17	6	6	9	38

Table 9: Non-enrolees by age groups.

Age groups	Number
0-4	1
5-9	3
10-14	7
15-19	11
20-24	5
25-29	2
30-34	3
35-39	2
40-44	1
45-49	1
50-54	1
55-59	1
Total	38

Timeliness of Primary Health Organisation enrolment

The numbers of people from refugee backgrounds who were newly enrolled in a PHO between 1/07/04 and 1/04/09 are shown in Table 10. Quota refugees arrive in groups to New Zealand six times each year and stay at MRRC in Auckland for 6 weeks. If people arrive in November or December, they are not necessarily expected to be registered in the PHO enrolment database in the same calendar year.

Table 10: The number of people from refugee backgrounds who are newly enrolled in a PHO by quarterly from 1/07/04 to 1/04/09.

First enrolment quarter	Arrival year of cohorts				Total
	2004	2005	2006	2007	
01/07/2004	98				98
01/10/2004	185				185
01/01/2005	219				219
01/04/2005	157				157
01/07/2005	18	160			178
01/10/2005	23	174			197
01/01/2006	8	151			159
01/04/2006	12	153			165
01/07/2006	6	23	203		232
01/10/2006	10	8	145		163
01/01/2007	1	22	153		176
01/04/2007	2	21	118		141
01/07/2007	4	3	25	206	238
01/10/2007	5	7	7	176	195
01/01/2008		2	1	164	167
01/04/2008	2	2	2	151	157
01/07/2008	1	4	7	21	33
01/10/2008	2		3	6	11
01/01/2009	3		2	1	6
01/04/2009	2		2		4
Never enrolled	17	6	6	9	38
Non enrolment percentage	2.2%	0.8%	0.9%	1.2%	
Total	775	736	674	734	2919

Note: The cohorts are defined by the year of arrival and the length of follow up /observation periods which are different. Hence, the non-enrolment percentage is not comparable between cohorts.

Proportionally more people from the 2007 cohort were enrolled in PHO in a timely manner than people from other earlier cohorts: 95% of the '2007' cohort were enrolled in PHO by 1 April 2008 compared to 85% of the '2004' cohort who were enrolled by 1 April 2005 as illustrated in Table 11.

Table 11: Number of people enrolled in PHO by 1 April in the following year after arrival in New Zealand.

Arrival year of cohorts	2004	2005	2006	2007
Number enrolled by 1 April in the following year	659	638	619	697
Number of people in each cohort	775	736	674	734
Percentage enrolled by 1 April in the following year	85.0%	86.7%	91.8%	95.0%

Hospitalisation

There were a total of 2168 inpatient hospital events recorded between 01/01/2004 and 31/03/2009 related to the study population. The hospitalisation data was stratified into separate cohorts by the year of arrival. Since each cohort has a different length of observation / follow up time and a different number of people in it, the total numbers of hospitalisation are not comparable between cohorts. The numbers highlighted in same colour represent the hospitalisation numbers at a similar follow up period.

Table 12: Number of hospitalisation events from 2004 to 2009

Year of admission	Arrival year of cohorts				Subtotal
	2004	2005	2006	2007	
2004	179				179
2005	184	140			324
2006	132	143	151		426
2007	163	124	156	113	556
2008	141	118	130	165	554
2009	38	28	29	34	129
Total hospitalisation	837	553	466	312	2168

It is worth noting that the majority of the study population never had a hospital admission during the study period. The annual age standardised hospitalisation rates are presented in Table 13 which accounted for differences in observation time, number of people, and age structure of the cohort. The annual age standardised hospitalisation rates ranged from 29,962 to 36,397 per 100,000 persons. Age standardisation rates for the period between 1/07/2006 and 30/06/2007 were calculated to allow comparison to the national hospitalisation of other groups in New Zealand (see discussion).

Table 13: Analyses of hospitalisation of people from refugee backgrounds from 2004 to 2009.

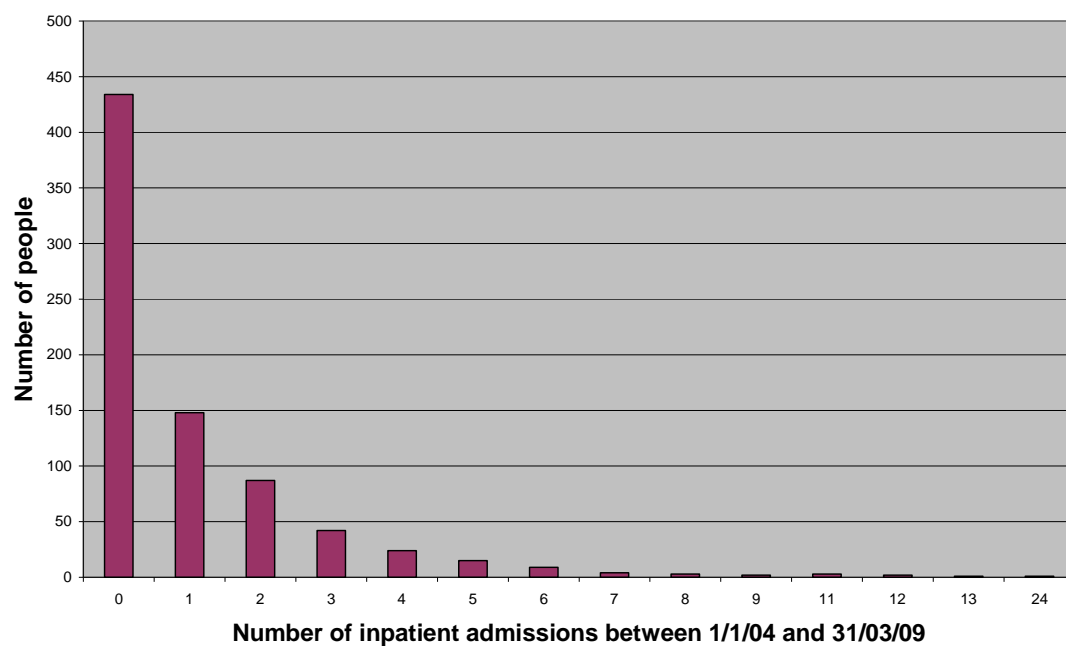
Description of analyses	Arrival year of cohorts			
	2004	2005	2006	2007
Number of people in each cohort	775	736	674	734
Number of people who had at least one hospital admission from 2004 to 2009	341	271	237	183
Number who did not have any hospital admission	434	465	437	551
Estimated average follow up and observation time for each person in the cohort (years)	4.75	3.75	2.75	1.75
Total time of follow up period (patient years)	3,681.3	2,760	1,853.5	1,284.5
Unadjusted hospitalisation rate (per 100,000 population)	22,737	20,036	25,142	24,290
Annual age standardised hospitalisation rate	34,658	29,962	36,397	30,236
Unadjusted hospitalisation rate after 1 year of arrival per 100,000 persons (e.g. hospitalisation rate of 2004 cohort in 2005, or 2005 cohort in 2006.	23,742	19,429	23,145	22,480
Age standardised hospitalisation rate after 1 year of arrival per 100,000 population	31,612	26,265	35,050	24,714
Age standardised hospitalisation rate between 1/07/2006 and 30/06/2007	29,220	30,034		

Hospital readmissions

Overall, sixty-five percent of the study population had not had a post-settlement public hospital admission during the study period. On the other hand, there were 1032 people contributing to a total of 2168 hospital events between 2004 and 2009.

The refugee cohort which arrived in New Zealand in 2004 was analysed for readmission (recurrent hospitalisations of any diagnosis) patterns, as this cohort had the longest follow up time. As illustrated in Figure 3, the majority (56%) of the cohort did not have a hospital admission in the subsequent four or more years after their arrival in New Zealand. However, there were 193 people who had 2 or more admissions and 40 people who had five admissions or more during the study period. The people who had five admissions or more contributed to a total of 293 admissions accounting for 35% of all admissions.

Figure 3: Distribution of number of the hospitalisations between 1/01/04 and 31/03/09 from 2004 cohort (with estimated follow time of 4.75 years)



Type of admissions

About half the hospital admissions were either an arranged admission or admission from the waiting list as shown in Table 14.

Table 14: Hospitalisation by admission type

Admission Types	Number of admissions
Arranged Admission	617
Acute admission	1,041
Admission from waiting list	510
Total	2,168

Length of hospital stay

The average length of hospital stay was 1.8 days. Almost half (49.6%, n=1075) of all hospital admissions were discharged on the same day. Among these same day discharges, 520 (48.4%) were intended day cases. Only 35% of admissions that were discharged on the same day were acute admissions. The 2168 admissions equated to 3876 'midnights' spent in hospital (bed days). There were 72 admissions with an inpatient stay of 10 days or more. These small number of admissions alone accounted for 1382 'midnights' spent in hospitals.

Table 15: Distribution of the length of hospital stay.

Length of hospital stay (days)	Number of hospital admissions
0	1075
1	466
2	212
3	125
4	81
5	42
6	23
7	34
8	23
9	15
10	8
11	12
12	5
13	9
14	5
15	1
16	3
17	3
18	4
19	2

Length of hospital stay (days)	Number of hospital admissions
20	3
21	3
22	2
23	1
24	2
28	2
30	2
31	1
49	1
53	1
91	1
121	1

Primary hospital diagnoses from 2004 to 2007

The most common primary hospital diagnosis was related to the diseases of the oral cavity, particularly dental caries (Table 16 and Table 17). Dental caries were almost exclusively diagnosed in young persons of 18 years of age or under (Table 18). The second most common reason to be admitted to hospital (at ICD 10: 3 digit level) was related to 'special screening examination for respiratory tuberculosis'. Child birth and complications related to child birth were also common reasons for admissions to hospital.

Dental caries (n= 140) and admission for screening examinations for respiratory tuberculosis (n=86) were also the two most common primary diagnoses made for the admissions that were discharged on the same day.

Table 16: The most common hospitalisation diagnoses made from 2004 to 2009 (ICD 10 codes at 2 digit level)

Primary diagnostic code	Number of admissions	Condition
K0	158	Diseases of oral cavity
R1	91	Symptoms and signs involving the digestive system and abdomen
Z1	87	Screening/exam
O6	77	Complications related to labour/delivery
O8	75	Delivery

Table 17: The most common hospitalisation diagnoses made from 2004 to 2009 (ICD 10 codes at 3 digit level)

Primary diagnostic code	Number of admissions	Condition
K029	141	Dental caries, unspecified
Z111	87	Special screening examination for respiratory tuberculosis
O80	70	Single spontaneous delivery
B349	34	Viral infection, unspecified
R104	31	Other and unspecified abdominal pain
Z3901	29	Care and examination immediately after delivery
O701	26	Second degree perineal laceration during delivery
O998	26	Other specified diseases and conditions complicating pregnancy, childbirth and the puerperium
R101	25	Pain localized to upper abdomen: Epigastric pain
O049	20	Medical abortion: Complete or unspecified, without complication
R103	20	Pain localized to other parts of lower abdomen
N390	18	Urinary tract infection, site not specified
R073	18	Other chest pain Anterior chest-wall pain NOS
K30	17	Dyspepsia
K590	16	Constipation
J189	15	Pneumonia, unspecified
O700	15	Perineal laceration during delivery

Table 18: Age distribution of the cases that were diagnosed with dental caries in hospital inpatients

Age Range	Number of cases
0-3	3
3-6	46
6-9	52
9-12	32
12-15	5
15-18	2
33-36	1
Total	141

In contrast to inpatient hospitalisation for dental related diagnoses, the outpatient emergency dental care services and dental treatments were predominately attended by adult patients.

Table 19: The number of outpatient emergency dental care services (for low income “adults”) received from 1/07/06 to 31/03/09.

Age Range	Number of appointments received
0-9	25
9-18	20
18-27	43
27-36	67
36-45	38
45-54	13
54-63	11
63-72	1
Total	218

Table 20: The number of outpatient dental treatment received from 1/07/06 to 31/03/09.

Age Range	Number of outpatient dental treatments received
0-9	58
9-18	12
18-27	58
27-36	45
36-45	63
45-54	25
54-63	18
63-72	1
Total	280

Longer stay hospitalisation

For the inpatient hospitalisations that were 10 days or longer; bronchiectasis (n=7), acute lower respiratory infection (n=3), care involving use of rehabilitation procedure (n=3) are the most common primary diagnoses made at ICD 10: 3 digit level. At ICD 10, 1 digit level, the common diagnoses were related to sequelae of infectious and parasitic diseases (n=14), complications of surgical and medical care (n=10) and diseases of oesophagus, stomach and duodenum (n=8).

Table 21: The types of diagnoses made in hospitalisations with a length of stay of 10 days or more. (First three diagnostic codes analysed at ICD 10: 1 digit level)

Diagnostic code ICD10: (1 digit level)	Diagnostic code description	Number of diagnoses made
B9	Sequelae of infectious and parasitic diseases	14
T8	Complications of surgical and medical care	10
K2	Diseases of oesophagus, stomach and duodenum	8
J4	Chronic lower respiratory diseases	7
M6	Disorders of muscles	6
K5	Non-infective enteritis and colitis	5
K8	Disorders of gallbladder, biliary tract and pancreas	5
O2	Other maternal disorders predominantly related to pregnancy	5

Type of procedures received in hospital

There were 1207 procedures recorded in the primary procedure codes in NMDS for the people from refugee backgrounds between 1/01/2004 and 31/03/2009. The most common types of procedures received by the study population were related to child birth as highlighted in Table 22. Dental procedures such as tooth removal also feature prominently. The common secondary procedure codes were mainly related to the type of anaesthesia received (Table 23).

Table 22: Type of procedures (primary procedure codes) received by the study population between 1/01/2004 and 31/03/2009

Procedure codes	Number of procedures	Name of procedure
9046700	151	Spontaneous vertex delivery
9731100	124	Removal of permanent tooth
3047301	52	Panendoscopy with biopsy
1652003	43	Emergency lower segment caesarean section
5600100	40	Computerised tomography of brain
3564301	29	Suction curettage following abortion or for termination of pregnancy
1370602	22	Transfusion of packed cells
4189801	20	Fibreoptic bronchoscopy with biopsy
9048100	17	Suture of 1st or 2nd degree tear of perineum
1652002	16	Elective lower segment caesarean section

Table 23: Secondary procedures codes

Procedure codes	Number of procedures	Name of procedure
9250202	291	Intravenous and inhalational anaesthesia
9250300	96	Intravenous sedation, anaesthetist controlled
9731100	68	Removal of permanent tooth
9046601	29	Surgical augmentation of labour
9048100	28	Suture of 1st or 2nd degree tear of perineum

Consistent with diagnoses made in hospital, dental procedures such as tooth removal were performed predominately in the younger age group (Table 24).

Table 24: Age distribution at the time of tooth removal

Age at time of removal of 'permanent' tooth	Total
0-3	2
3-6	47
6-9	44
9-12	27
12-15	2
15-18	1
33-36	1
Total	124

Out of the 124 dental procedures (tooth removal), 102 of them had received intravenous and inhalational general anaesthesia according to the first twenty ICD 10 procedural field. Out of 68 'removal of permanent tooth' coded in the secondary procedure field, 64 of them also had 'removal of permanent tooth' coded in the primary procedure field, implying that each tooth extraction was coded separately.

Further analyses of the procedures received were undertaken for the 2004 refugee cohort (Table 25). Dental procedures were commonly carried out within the first year of arrival. Procedures related to child birth or complications of childbirth predominated in the latter years.

Table 25: Number of procedures received by the 2004 refugee cohort who arrived to NZ from 2004 to 2008.

2004

Name of procedures	Number
Removal of permanent tooth	32
Fibreoptic bronchoscopy with biopsy	7
Panendoscopy to duodenum with biopsy	3
Spontaneous vertex delivery	3
Coronary angiography with left heart catheterisation	2

2005

Name of procedures	Number
Spontaneous vertex delivery	17
Panendoscopy to duodenum with biopsy	12
Emergency lower segment caesarean	4

Name of procedures	Number
section	
Repair of inguinal hernia, unilateral	3
Removal of permanent tooth	3

2006

Name of procedures	Number
Spontaneous vertex delivery	17
Panendoscopy to duodenum with biopsy	12
Emergency lower segment caesarean section	4
Repair of inguinal hernia, unilateral	3
Suture of 1st or 2nd degree tear of perineum	3

2007

Name of procedures	Number
Spontaneous vertex delivery	12
Computerised tomography of brain	6
Myringoplasty, transcanal approach	3

2008 (up to March)

Name of procedures	Number
Spontaneous vertex delivery	4
Computerised tomography of brain	3

Emergency Department attendance

According to the NNPAC database, there were a total of 1476 emergency department attendance events in public hospitals between 1/07/06 and 31/03/09 (Table 26). 33% of the emergency department attendees were subsequently admitted as inpatients (n=481).

Emergency department attendance numbers in 2008 were analysed, as shown in Table 27 and Table 28. By 2008, the age standardised emergency department rates had gradually been falling with each subsequent cohort. In 2008, the 2004 cohort had an emergency department attendance rate of 32,538 per 100,000 compared to 19,310 per 100,000 from the 2007 cohort. However, this trend was not as apparent if the average annualised age standardised rates were calculated from all the available data.

Table 26: Emergency department attendance numbers from 2006 to 2009. (ED data only available from 1/07/06 to 31/03/09)

Year of attendance in emergency department	Year of arrival				Total
	2004	2005	2006	2007	
2006	62	66	62		190
2007	165	139	84	100	488
2008	213	144	129	157	643
2009	50	32	24	40	146
Total	490	381	299	297	1467

Table 27: Emergency department attendance numbers in 2008 by year of arrival and by age.

Age of patient	Year of arrival				Total
	2004	2005	2006	2007	
0-10	36	24	26	44	130
10-20	76	59	30	31	196
20-30	35	24	22	34	115
30-40	23	15	24	34	96
40-50	21	13	19	6	59
50-60	14	5	4	4	27
60-70	5	3		4	12
70-80	3	1	4		8
Total	213	144	129	157	643

Table 28: Age specific Emergency department attendance rate of quota refugees in 2008 (per 100,000 population)

Age range	Year of arrival			
	2004	2005	2006	2007
0-10	16,216	12,121	19,697	25,143
10-20	29,119	23,228	15,228	17,318
20-30	31,532	20,168	17,054	22,819
30-40	30,667	19,481	18,045	29,310
40-50	35,593	21,667	33,929	10,169
50-60	45,161	29,412	19,048	11,765
60-70	50,000	30,000	0	22,222
70-80	75,000	100,000	133,333	0
80-90	0	0	0	0
Age standardised ED attendance rate in 2008	32,538	23,606	22,615	19,310

Table 29: Emergency department attendance

Emergency attendance	Year of arrival			
	2004	2005	2006	2007
Observation period (years)	2.75	2.75	2.63	1.75
Annual age standardised ED attendance rate during the entire study period by quota refugees	26,755	20,310	20,257	23,817

Linkage between multiple datasets by unique identifier

There were 38 people who were never enrolled with a PHO. Linkage between multiple datasets by a unique identifier may help determine whether these are people have significant morbidity. As shown in Table 30, there were 6 individuals out of 38 (16%) who had attended an emergency department (ED) in New Zealand.

Table 30: ED attendance numbers by PHO non-enrolees.

ED Attendance number	Year of arrival		
Unique ID number	2004	2007	Grand Total
881	1		1
936	2		2
1754	1		1
2020		1	1
2320		9	9
2643	1		1
Total	5	10	15

Six of out of the 38 (16%) non-enrolees had one or more hospitalisations in New Zealand. This compares to 35% of the enrolled population who had had at least one hospitalisation.

Table 31: Hospitalisation numbers by non-enrolees.

Hospitalisation number	Year of hospitalisation					
Unique ID number assigned	2004	2005	2007	2008	2009	Total
936					1	1
1163		1				1
1668	1					1
2020					1	1
2320			4	2	1	7
2638				1		1
Grand Total	1	1	4	3	3	12

The low levels of hospital or emergency department attendances may indicate that the non-enrolees are in good health or they have left New Zealand. As shown in Table 32, the majority of non-enrolees have had some forms of contact with the health services in New Zealand: 30 out of 38 (79%) have had a hospital admission, an outpatient appointment, or have received lab tests or pharmacy dispensing. The

average age of the people (n=8) who are not enrolled and did not have any health contact was 20 (ranging from 7 to 44).

Table 32: Analyses of the 38 people who never enrolled with a PHO.

	Year of arrival				Total
	2004	2005	2006	2007	
Total number of never 'enrollee'	17	6	6	9	38
Number who received no meds	8	1	3	0	12
Number who received no labs	16	6	5	6	33
Number who did not have any lab or med dispensed	8	1	3	0	12
Number who had no hospitalisation, no outpatients, no labs, no meds.	6	0	2	0	8

Mental Health services utilisation

There were 1535 contacts with mental health services recorded for the people with refugee backgrounds from 1/01/04 to 30/06/08. The most common contacts were individual treatment attendances (n=970) and care coordination (n=319). The community team provided the highest number of mental health contacts (n=857) accounting for 56% of the total. The child, adolescent and family team and the refugee team provided 473 (31%) contacts and 77 (5%) contacts respectively.

Table 33: Analyses of mental health services attendance of people from refugee backgrounds from 1/01/04 to 30/06/08.

	Year of arrival			
	2004	2005	2006	2007
Number of mental health services attended	520	387	320	308
Number of unique individuals seen by mental services	48	38	28	32
Number of refugees in each cohort	775	736	674	734
Proportions of people who had contact with mental health services (%)	6.2	5.2	4.2	4.4

The Ministry of Health publishes the mental health service utilisation rates for the 12 month period between July and June every year. It presents age standardised rates of mental health service utilisation as unique patients per 100,000 persons. The mental health utilisation rates of 2004 refugee cohort are presented in the corresponding periods for comparison (Table 34). There were 24 unique patients from the cohort who attended mental health service appointments from July 2004 to June 2005. This translated to an age standardised rate of 4,443 unique patients per 100,000 persons. As per Table 34, the utilisation of mental health services was remarkably higher than other groups in New Zealand during their first year of arrival. However, the utilisation rates in subsequent years gradually dropped to the level of mental health utilisation for non-Maori, non Pacific people.

Table 34: Age standardised rates of mental health service utilisation by the 2004 cohort from July 2004 to June 2007 compared to other population groups in New Zealand (unique patients per 100,000 persons).

Age standardised rates by population subgroups	Time period of observation (from July to June)		
	2004/2005	2005/2006	2006/2007
2004 refugee cohort	4443	2794	2197
Non-Maori, non-Pacific ^{9, 10}	2127	2161	2182
Maori ^{9, 10}	2800	2957	3046
Pacific ^{9, 10}	1479	1430	1774

Number of active tuberculosis (TB) disease cases

The hospitalisation and community pharmaceutical dispensing data from 1/04/04 to 31/03/09 identified 32 cases of active TB disease. As shown in Table 35, 56% (n=18) of the cases were identified by both methods.

Table 35: Number of tuberculosis cases by method of detection

Method of detection	Cohort of refugees by year of arrival			
	2004	2005	2006	2007
Hospitalisation	11	4	5	1
Community dispensing	10	6	4	5
Identified by both methods	7	3	3	5
Total number of tuberculosis cases	14	7	6	5

As shown in Table 36, the majority (72%) of the TB cases were diagnosed in the year of arrival in New Zealand. The estimated crude age standardised prevalence of TB was based on the number of TB cases diagnosed in the year of arrival. Based on the entire study population, the crude prevalence of TB for was 788 cases per 100,000 persons. Age standardised prevalence was 1296 cases per 100,000 persons.

Table 36: Number of tuberculosis cases by year of diagnosis

Year of diagnosis	Cohort of refugees by year of arrival			
	2004	2005	2006	2007
2004	8			
2005	3	7		
2006	0	0	5	
2007	0	0	1	3
2008	2	0	0	2
2009	1	0	0	0
Total	14	7	6	5

Treatment of latent tuberculosis infection

Isoniazid dispensing was used as a surrogate marker of latent tuberculosis infection (LTBI) in this study. There were 223 people (7.6%) received isoniazid treatment without having active TB disease (Table 37).

Table 37: Number of people who received isoniazid treatment from 2004 to 2007

	Year of arrival				Total
	2004	2005	2006	2007	
Number of people who received isoniazid treatment	73	58	48	44	223
Total number of people in cohort who did not have TB disease	761	729	668	729	2887
Proportion of people who received isoniazid treatment	9.6	8.0	7.2	6.0	7.7
Estimated time of observation time (years)	4.75	3.75	2.75	1.75	
Total time of follow up period (patient years)	3,681.3	2,760	1,853.5	1,284.5	9579.2
Crude isoniazid treatment rate	1,983	2,101	2,590	3,425	

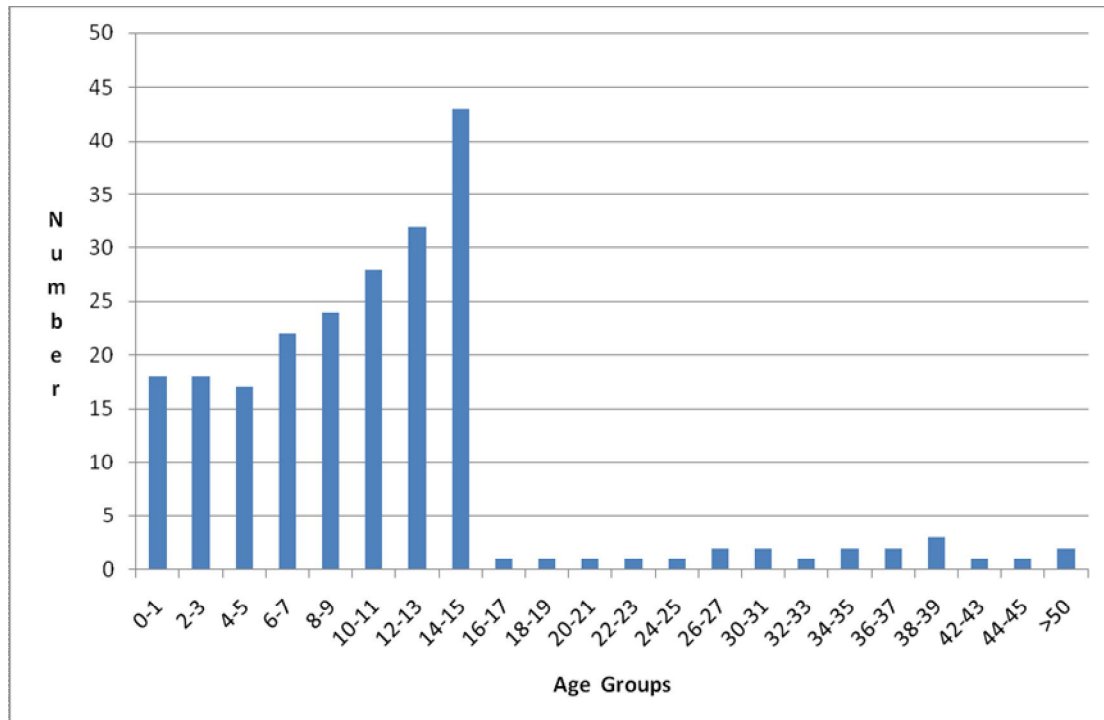
As highlighted in yellow on Table 38, most patients commenced isoniazid treatment on the year of arrival. The patients who received treatment on the subsequent year may be related to the groups who arrived towards the end of a calendar year.

Table 38: LTBI treatment by year of commencement.

Year in which isoniazid treatment commenced	Year of arrival				Total
	2004	2005	2006	2007	
2004	56				56
2005	15	50			65
2006	2	6	39		47
2007			8	34	42
2008		2	1	10	13
Total	73	58	48	44	223

Over 90% of people who received isoniazid were 15 years of age or under (n=202) as shown in Figure 4. About 17% of all 15 year olds or under were treated with isoniazid.

Figure 4: Number of individuals who received isoniazid treatment from 1/01/04 to 31/03/09 by age group



Discussion

This study systematically describes the health outcomes and health services utilisation of people from quota refugee backgrounds who settled in New Zealand from 2004 to 2007. Overall, this population has a very young age structure. Most people (59%) reside within the three District Health Boards in the metro Auckland region. A majority of the people in the study are of Middle Eastern, African, and Asian ethnicities.

Primary health organisation enrolment rates

It is very pleasing to find that this population has a high level of primary health organisation enrolment, particularly as the process of finding, registering and getting to see a general practitioner has been identified as a barrier to seeking medical care in overseas studies.^{11, 12} The high PHO enrolment rate (95%) may be a positive reflection of the re-settlement program provided at the MRRC when refugees first arrive in New Zealand that includes health, education, welfare and housing support.⁵

The high level of primary care enrolment means that vast majority of people are potentially contactable directly via primary care. This should be seen as an exciting opportunity to implement population based interventions (such as health promotion activities or a screening program) through proactive direct invitations from primary care that aims to ensure the health needs of people from refugee backgrounds are adequately met.

Hospitalisation and emergency department attendance

The age standardised hospitalisation rates of the people from refugee backgrounds are markedly higher compared to other cohorts of people in New Zealand. The average annual hospitalisation rates of people from refugee backgrounds ranged from 29,962 to 36,392 hospitalisations per 100,000 people. For illustrative purposes, the latest published national hospitalisation rates were used for comparison (from 1 July 2006 to 30 June 2007).¹³ As shown in Table 39, the 2005 cohort in 06/07 age standardised hospitalisation rate was 99% higher than Maori, 102% higher than Pacific people and 170% higher than non-Maori, non Pacific people hospitalisation rates in the same time period.

Table 39: Age standardised hospitalisation rates in selected populations between 1 July 2006 to 30 June 2007 (per 100,000)

Name of group	Age standardised hospitalisation rate (per 100,000)
2005 refugee cohort	30,034
Maori	15,079
Pacific	14,897
Non-Maori, non-Pacific	11,131

While people from refugee backgrounds had a higher rate of hospitalisation, their average length of stay (1.8 days) was much shorter in comparison to the national average of 4.5 days.¹³ Almost half of the hospital admissions were discharged on the same day. However, most of these same day discharges (65%) were planned admissions such as admission from waiting list for a procedure, suggesting that these admissions might be appropriate.

Recurrent hospital admission (remission) analyses were carried out for the cohort who arrived in New Zealand in 2004 since they have the longest observational time. The cohort has an estimated average follow up time of 4.75 years. In fact, the majority of the 2004 cohort did not have a hospital admission within the observational period. A relatively small proportion people from the cohort (5%, n=40), accounted for a substantial proportion (35%) of all hospital admissions.

Based on these analyses it is not known whether these hospital admissions were avoidable or indicated. However, these analyses demonstrate that there is a small group within the refugee population who have very high health needs. These people may be identifiable early in the medical centre at MRRC, and policy or interventions could be developed to ensure people with complex health issues are well looked after by the health system.

Emergency department (ED) attendance that takes longer than 3 hours are labelled as hospital admissions. Only 33% of the ED attendances were subsequently admitted in hospitals. In other words, between 1/07/06 to 31/03/09, 67% ED attendances (n=995) took 3 hours or less indicating that there might be scope to reduce ED attendance numbers through effective and accessible primary health care. Even though this study has demonstrated that there was a high level of PHO enrolment, it does not automatically mean that primary care has been accessed appropriately. Potential barriers to primary health access might include language and cultural barriers, and/or poor understanding of the publicly funded health service entitlements.

The most common diagnoses made in hospital were related to the diseases of the oral cavity, particularly dental caries. Consistent with this diagnosis, procedures such as “removal of permanent tooth” were also common. Further analyses revealed that virtually all (99%) dental caries diagnosed (140/141) and permanent tooth removal (123/124) performed as inpatients were for children or young persons aged 18 or under. However, outpatient dental treatments and outpatient emergency dental care services were frequently attended by adults (Table 19 and Table 20).

These findings are not unexpected as many people from refugee backgrounds before resettlement would not have received any dental care or have access to basic dental preventative measures, such as fluoridated toothpaste.¹⁴ A substantial proportion (82%) of tooth removal procedures required general anaesthesia, which suggests the dental diseases might be more severe or complicated. Furthermore, the longitudinal analyses of the 2004 refugee cohort (Table 25) suggested that dental procedures were relatively uncommon 2 years after arrival in New Zealand. This possibly implies that most of the major dental issues detected that require dental procedures as inpatients are addressed soon after resettlement in New Zealand.

While the findings from this study are consistent with the notion that children from refugee backgrounds have high dental needs, whether or not these health needs are adequately addressed remains uncertain as this study did not directly analyse the dental service utilisation in respect to the level of dental needs.

In New Zealand, basic dental care is provided free of charge for children or teenagers under 18 years of age. However, the utilisation of the free oral health service for the adolescents (13 to 17) has been traditionally poor even in the general population.¹⁵

The potential language difficulties may pose an extra barrier for people from refugee backgrounds to receiving the appropriate dental care.¹⁶ Given that people from refugee backgrounds have a high level of PHO enrolment, primary care is an important gatekeeper to ensure that they receive the appropriate publicly funded dental services.

For the inpatient hospitalisations that took 10 days or longer, the common diagnoses were related to sequelae of infectious and parasitic diseases (n=14), complications of surgical and medical care (n=10) and diseases of oesophagus, stomach and duodenum (n=8). Long term conditions such as coronary heart disease, cancer, and chronic obstructive airway disease are uncommon in the younger age group. Only a small number people from refugee backgrounds are expected to be admitted to hospital with long term conditions, given that the average age at the time of arrival is only 21.8 years.

Another explanation is that the patients with long term conditions are managed well as outpatients and consequently avoidable hospitalisation is prevented. A recent study showed that the health outcomes of HIV infected quota refugees who resettled in New Zealand were very good with the majority (61%) of patients who commenced highly active antiretroviral therapy had an undetectable HIV viral load after 1 year of treatment.¹⁷

Tuberculosis

People from refugee backgrounds commonly originate from areas where the prevalence of tuberculosis is high. According to the World Health Organization (WHO), Asia and Africa have the highest prevalence of tuberculosis in the world, accounting for 55% and 31% of global cases respectively.¹⁸ One recent US study published in New England Journal of Medicine found that more than 90% of all smear negative TB cases of US bound refugees between 1999 and 2005 were born in countries that had a tuberculosis prevalence of 100 or more cases per 100,000.¹⁹ It also estimated that the crude prevalence of TB among 378,506 US bound refugees was 1036 cases per 100,000 persons between 1999 and 2005.

This study used hospital discharge codes and pharmaceutical dispensing data to estimate the number of patients with tuberculosis disease. There are limitations with the pharmaceutical dispensing dataset, as it only records community pharmacy dispensing. Moreover, dispensing or supplies from inpatient pharmacy and treatment received during inpatient stays are not recorded. Hence, there are a number of patients diagnosed with tuberculosis in hospital that did not appear to have received any treatment from community pharmacy.

Nevertheless, this study suggests that people from refugee backgrounds become less likely to have TB disease, the longer they have been in New Zealand. Over 90% of TB cases were diagnosed within the first two years of arrival. This finding would be consistent with the low background incidence rate of TB in New Zealand (6.8 per 100,000 in 2007).²⁰

However, quota refugees remain at a relatively high risk of developing TB disease compared to the other populations in New Zealand because substantial proportions of them would have had exposure of tuberculosis in the past with evidence of latent infection. Recent studies estimated that about half of the refugees immigrating to Minnesota, or Canada had a positive Mantoux test result of ≥ 10 -mm induration.^{21, 22}

In New Zealand, about 7.7% of the people from refugee backgrounds overall have received isoniazid treatment for presumed latent TB infection. However, the vast majority (90.5%) of patients who receive isoniazid were 15 year olds or younger. This is an expected finding since all 15 year olds or under routinely receive a Mantoux

test from the medical clinic in MRRC.²³ For the older patients, Mantoux tests are only carried out on request by the chest or infectious disease clinics.

The estimated crude prevalence of TB for the refugee population in this study was 788 cases per 100,000 persons. The age standardised prevalence was 1296 cases per 100,000 persons. It is difficult to directly compare the estimated prevalence of tuberculosis of the study population to other populations for several reasons.

- The proportion of people with tuberculosis at the year of arrival may be a reflection from incident as well as prevalent cases. For example, if a person arrived in New Zealand in January and was only subsequently diagnosed with TB in November, it would be highly likely that she / he was an incident case.
- The people from refugee backgrounds are actively screened by the medical services in New Zealand, as evidenced by the high number of admissions for special screening examinations for respiratory tuberculosis (n=87), and the number of people (n=223) who receive isoniazid treatment presumed for latent TB infection. All quota refugees receive either a Mantoux test and/or a chest X-ray from the medical clinic at MRRC.²³ However, the screening protocol of the MRRC is different from the US which makes direct comparison of TB prevalence more problematic. In the US, people who are 15 year old and older are offered a chest X-ray, and the under 15 year olds are offered screening only if they had; a history of tuberculosis, signs or symptoms suggestive of tuberculosis, or close contact with someone who had tuberculosis.¹⁹
- The prevalence estimated by this study is likely to be an underestimate, given that there is a delay before the diagnosis is captured by the hospitalisation or pharmaceutical dispensing dataset.

Mental health service utilisation

Many people from refugee backgrounds have suffered physical abuse and have been exposed to horrific and life threatening events.⁵ Understandably, mental health conditions, such as anxiety, depression and post-traumatic stress disorder are more common among people from refugee backgrounds compared to the general population.²⁴

However, it is important for health professionals not to misdiagnose normal reactions to pre- and post-migration stressors as mental illness.²⁴ This study confirmed that people from refugee backgrounds had a high level of mental health service utilisation particularly within the first couple years of arrival. For example, the age standardised rates the 2004 refugee cohort in 2004/05 were 109% higher

than non-Maori, non Pacific people, 59% higher than Maori and 200% higher than Pacific people. However, the utilisation rates dropped rapidly to a similar level as non-Maori and non-Pacific people in the subsequent years. A follow up study in a few years time would be helpful to ascertain whether this observed trend continues.

Strengths of the study

The encrypted NHI linkage allows many meaningful analyses of routinely collected national health data to be carried out at a relatively low cost. This study examined the entire cohort of quota refugees who settled in New Zealand from 2004 to 2007. The methods used in this study to examine the health outcomes and health service utilisation can be easily replicated in the future to study longer term health outcomes of the same population.

The more sophisticated linkage method proposed in this study may be used to examine health outcomes of other population groups. For example, it may be used to determine whether people in the general population who are not enrolled in a PHO are associated with a high morbidity and mortality burden.

Weakness of the study

All the analyses were based on the administrative data that is routinely collected. The administrative data does not provide detailed clinical information that a clinical notes audit may reveal. Each of the databases has its own specific limitations.

- The National Non-admitted Patient Collection does not record the diagnoses of patients and only has purchase units to describe the type of outpatient events.
- The Pharmaceutical Collection only records the community dispensing and not hospital dispensing.
- The Laboratory Claims Collection contains information about the type of the laboratory tests that were undertaken but the results of the laboratory tests were not available.
- The availability of information regarding the cause of death in the Mortality Collection is always delayed. As of April 2009, the latest mortality data available was in 2006.
- The Mental Health Information National Collection (MHINC) contains data about the secondary inpatient and community mental health services provided by DHBs. However, it does not include most of the services provided by Non-Government Organisations or primary health care. For example, mental health services provided by the Refugees as Survivors

Centre may not be recorded in MHINC. MHINC was decommissioned on 30 June 2008 and was replaced by the Programme for the Integration of Mental Health Data (PRIMHD). However, PRIMHD is incomplete because only 15 out of the 21 DHBs are supplying data to it as of May 2009.

The other weakness of the study is that it is difficult to identify people who have left New Zealand. As a consequence, the health service utilisation estimates may be slightly conservative.

Conclusion

This study confirms that people from refugee backgrounds have high health needs as illustrated by the high levels of health service utilisation. The mortality rate is low because this population has a very young age structure. A further qualitative study would be helpful to identify whether there are any outstanding unmet needs.

The tuberculosis screening carried by the refugee health centre in MRRC appeared to be working reasonably well since there were very few cases of developed tuberculosis after 2 years of arrival.

The most common hospital diagnoses are related to; oral diseases, screening for tuberculosis and obstetric problems. Hospitalisations related to long term conditions are not expected to be apparent in this study since it only covers a relatively short follow up period. A follow up study with a much longer observation period would be useful to access the disease burden from long term conditions and mortality trends of this population.

The high PHO enrolment is a positive finding but it does not necessarily correlate with good access to primary care. Hence, it is important for primary care to be vigilant that people from refugee health backgrounds are receiving the appropriate publicly funded health service entitlements such as free dental services for teenagers. The high PHO enrolment should be also seen as an exciting opportunity for primary care to develop and implement population based health promotions or preventive strategies to ensure the health needs of this population are adequately met.

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